The IMF As a Biased Global Insurance Mechanism: Asymmetrical Moral Hazard, Reserve Accumulation, and Financial Crises

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Abstract A large literature has established that the International Monetary Fund (IMF) is heavily politicized. We argue that this politicization has important consequences for international reserve accumulation and financial crises. The IMF generates moral hazard asymmetrically, reducing the expected costs of risky lending and policies for states that are politically influential vis-à-vis the institution. Using a panel data set covering 1980 to 2010, we show that proxies for political influence over the IMF are associated with outcomes indicative of moral hazard: lower international reserves and more frequent financial crises. We support our causal claims by applying the synthetic control method to Taiwan, which was expelled from the IMF in 1980. Consistent with our predictions, Taiwan's expulsion led to a sharp increase in precautionary international reserves and exceptionally conservative financial policies.

A large literature has established that the International Monetary Fund (IMF) is heavily politicized.[1] Despite considerable shifts in the global balance of economic power, influence over the IMF has been largely path dependent.[2] Several creditor states, particularly the United States and major European countries, continue to exercise outsized influence over IMF lending.[3] This influence exercised by a subset of states in the IMF—through their overrepresented voting shares, personnel, or informal influence—distorts the application of conditional lending, resulting in harsh treatment of some states and lenient policies toward others. In turn, political intervention often reduces the credibility of IMF conditionality and undermines reforms in borrowing states.[4]

We thank James Fearon, Judy Goldstein, Dennis Quinn, James Vreeland, participants at workshops at Georgetown University, Stanford University, the International Political Economy Society Annual Meeting, the Political Economy of International Organizations Annual Meeting, and two anonymous reviewers for helpful feedback. We also thank current and former officials of the IMF, Chinese government, Japanese Ministry of Finance, Japanese Ministry of Foreign Affairs, Taiwanese Ministry of the Economy, Taiwanese Ministry of Foreign Affairs, United States Department of State, United States Department of the Treasury, and World Bank who were exceedingly gracious with their time and resources. This research was made possible by the generous support of the Shorenstein Asia Pacific Research Center, Freeman Spogli Institute for International Studies, and Sakurako and William Fisher.

1. Copelovitch 2010b; Dreher and Jensen 2007; Kahler 1993; Oatley and Yackee 2004; Stone 2008; Thacker 1999.
2. Lipscy 2015a, 2017.
3. Stone 2011.
4. Barro and Lee 2005; Stone 2002; Vreeland 2003.

International Organization 73, Winter 2019, pp. 35–64

doi:10.1017/S0020818318000371

We argue that political imbalances in IMF governance have broader consequences for the global economy. Political influence vis-à-vis the IMF affects expectations about whether and how the institution will intervene in the event of a crisis. This alters the incentives of policymakers and private investors, encouraging risk taking in some countries but not others. Countries that expect favorable treatment from the IMF are subject to moral hazard: the expectation of a generous bailout reduces the perceived costs of risky policies, such as holding less international reserves or relaxing financial regulations. By contrast, countries lacking political influence in the IMF face strong incentives to pursue self-insurance. In effect, the IMF is a biased global insurance mechanism: moral hazard associated with IMF lending is distributed asymmetrically across the international system. "Too big to fail" is a function not of economic importance per se, but of political clout vis-à-vis the IMF.

Our article makes several novel empirical contributions. First, using a panel data set covering the period from 1980 to 2010, we show evidence consistent with the asymmetrical distribution of IMF moral hazard. Specifically, greater political influence vis-à-vis the IMF is associated with: (1) more generous treatment by the IMF (higher likelihood of receiving IMF lending with fewer conditions); (2) underinsurance (lower level of international reserves); and (3) more frequent financial crises (higher likelihood of currency and banking crises). The first finding reinforces the existing literature on IMF lending, while the last two are novel and suggest that political distortions associated with IMF governance have important, previously underexplored effects on international economic relations. We also develop a new measure of political influence vis-à-vis the IMF using principal component analysis, combining information from proxies used in the existing literature that often produced weak or inconsistent findings.

Second, to evaluate our proposed causal mechanisms, we exploit the expulsion of Taiwan from the IMF. Although the IMF has been often criticized for generating moral hazard, it has been tricky to demonstrate empirically.[5] The institution has near-universal membership and has existed continuously since World War II as the contemporary international financial system developed and matured. Entry into the IMF generally reflects self-selection. There is therefore no obvious control condition against which to evaluate the effect of IMF moral hazard. However, Taiwan offers a useful counterfactual case. Taiwan was expelled from the IMF in 1980 because of a sovereignty dispute with China, abruptly eliminating the possibility of any financial support. Expulsion was involuntary, the precise timing was unknown ex ante, and the final disposition of Taiwan was uncertain. Using the synthetic control method, we demonstrate that expulsion was associated with a dramatic increase in Taiwan's international reserves, consistent with our predictions. Taiwan has also maintained exceptionally conservative financial policies, citing its inability to rely on the IMF.

Political imbalances in the Bretton Woods Institutions are a major subject of contestation among leading economies, particularly with the rise of China and its

5. Frankel and Roubini 2002; Rogoff 2002; Vaubel 1983.

initiatives to reshape the international order.[6] Our empirical results suggest that contestation over the IMF is not a simple matter of national prestige, but an issue with significant consequences for international economic relations. The massive accumulation of reserves among some developing states represents a perverse flow of capital from poor to rich countries, which may contribute to broader economic distortions such as trade imbalances and asset price bubbles.[7] Most existing explanations of economic imbalances associated with reserve accumulation focus on underlying economic factors or mercantilist motivations.[8] Our findings suggest that political imbalances in the IMF contribute to economic imbalances by distorting the pattern of international reserve accumulation. Similarly, IMF politicization may account for some of the variation in the cross-national incidence of financial crises, which are disruptive economic events whose causes remain a subject of intense debate.[9]

The IMF As a Biased Global Insurance Mechanism

It is now well known that policymaking in the IMF is heavily biased by the political and economic interests of a subset of member states, particularly the United States and several major Western European countries. Consequently, we may think of the IMF as a *biased global insurance mechanism*. We argue that this bias produces predictable and consequential distortions in international reserve accumulation and the incidence of financial crises.

In most domestic markets, insurance providers are prevented from overt discrimination based on arbitrary characteristics such as social status and race.[10] Where discrimination occurs, it tends to be ex ante—at the initial stages of entering into a contract—during which the insurer evaluates the feasibility of insurance and the appropriate premium based on allowable risk factors.[11] It is therefore unusual for insurers to discriminate against policyholders ex post—upon filing of an insurance claim—unless there is reason to suspect material misrepresentation of facts. Similarly, a domestic lender of last resort, such as a central bank, has the regulatory capability to perform ex ante screening—banks that fail to meet risk criteria, such as capital adequacy rules, can be reprimanded or shut down.[12] This capability is much

6. Ikenberry and Lim 2017; Lipscy 2015b.

7. Gourinchas and Jeanne 2007; Summers 2007. For potential impact on US interest rates and the housing bubble, see Bernanke, Reinhart, and Sack 2005; Roubini and Setser 2005; Truman 2005.

8. For example, a global savings glut (Bernanke 2005), distortions in domestic policies followed in the US and abroad (Obstfeld and Rogoff 2009), a global shortage in reliable and tradable assets (Gourinchas, Caballero, and Farhi 2008), and asymmetries in financial market depth (Mendoza, Quadrini, and Rios-Rull 2007). For a discussion of mercantilism as an explanation for reserve accumulation, see Aizenmann and Lee 2005; de Beaufort Wijnholds and Sondergaard 2007; Dooley, Folkerts-Landau, and Garber 2003.

9. Among others, see Chinn and Frieden 2011; Copelovitch, Frieden, and Walter 2016; Helleiner 2011; Lipscy 2018; Mosley and Singer 2009; Reinhart and Rogoff 2009; Rosas 2009.

10. Avraham, Logue, and Schwarcz 2014; Gaulding 1994.

11. Vaughan and Vaughan 2013.

12. For example, Bhattacharya, Arnoud, and Thakor 1998.

more limited at the international level where, under normal conditions, a lender of last resort such as the IMF has limited ex ante control over the economic policies of sovereign governments. Available tools tend to be limited to surveillance and consultation.[13]

These limitations put a much greater onus on ex post discrimination for the IMF. When a country experiences balance-of-payments difficulties, the IMF must weigh easy provision of rapid liquidity, which facilitates a resolution to the country's problems, and moral hazard concerns, the possibility that a bailout will incentivize risky behavior in the future. Hence, a decision by the IMF to lend, and on what terms, is a tricky one involving considerable discretion on a case-by-case basis. Consequently, IMF lending decisions tend to be heavily politicized.

Work by both political scientists and economists has shed light on the biases of IMF decision making.[14] The IMF is relatively path dependent: the institution tends to underrepresent the interests of countries that experienced rapid economic growth since the end of World War II, limiting the ability of Japan and most developing countries to directly shape IMF policy outcomes.[15] Hence, Western nations, particularly the United States and major European countries, continue to exercise outsized influence over IMF lending decisions.[16]

Our assertion is that political distortions of IMF decision making have broader, systemic consequences for the global economy. The politicization of the IMF follows a predictable pattern. The IMF tends to discriminate against a certain set of country characteristics that have no relevance to economic merits, much as a domestic insurer might discriminate based on economically irrelevant characteristics such as gender, race, or sexual orientation. This pattern of discrimination has important consequences for member states' policy decisions as well as the general operation of the global financial system.

We focus on two potential sources of discrimination. First, IMF lending can be biased by political imbalances within the decision-making structures and practices of the institution. The United States and major European countries exert outsized influence over IMF decision making, thanks to both formal features such as overweighed voting shares and informal factors, such as overrepresentation of nationals among staff and privileged access to information.[17] Hence, IMF lending tends to be more forthcoming and generous for countries that are either directly overrepresented or have close economic or diplomatic ties to influential states. Second, as we discuss more extensively in the empirical section, in one extreme case, any possibility of IMF support was terminated for a major economy—Taiwan—for nontechnocratic, political reasons.

13. Lombardi and Woods 2008.
14. Copelovitch 2010b; Dreher and Jensen 2007; Kahler 1993; Oatley and Yackee 2004; Stone 2008; Thacker 1999.
15. Lipscy 2015a, Lipscy 2017, chapter 4.
16. Stone 2011.
17. Ibid., 52–57.

Scholars have often called attention to the potential for the IMF to produce moral hazard in the international system.[18] Our argument is that this potential for moral hazard is asymmetrically distributed. Moral hazard is particularly acute for countries that anticipate generous treatment from the IMF because of direct overrepresentation or strong political or economic ties to influential states within the institution. Equally problematic, but less frequently discussed, is the distortion produced by lack of influence vis-à-vis the IMF. The perception that the IMF is not responsive to their concerns can curtail financial institutions' incentives to engage in cross-border lending and lead countries toward aggressive accumulation of foreign reserves as a means of self-insurance.

Our predictions are summarized in Table 1. If our premise is correct, countries that are subject to asymmetrical moral hazard—because of direct influence over the IMF or indirect influence through their close ties with the US or major European states—should receive more frequent lending from the institution with less onerous conditionality: this has been well documented in existing literature.[19] Our core predictions concern the broader consequences of asymmetrical moral hazard on reserves and financial crises: (1) countries that are politically influential vis-à-vis the IMF will hold a lower level of precautionary international reserves because the IMF offers a readily available and attractive insurance mechanism. On the other hand, countries with limited political influence vis-à-vis the IMF will purse self-insurance by holding a higher level of reserves. (2) Political influence vis-à-vis the IMF will be associated with more frequent financial crises. This follows from the asymmetrical moral hazard generated by expectations of generous treatment by the IMF. Expectations of IMF favoritism create incentives for policymakers to pursue risky policies—for example, holding low levels of reserves, loosening financial regulations, or promoting short-term capital inflows—and for private actors to pursue risky lending and investments on the assumption that a generous bailout will be forthcoming in the event of a crisis. In turn, these incentives will elevate the risk of financial crises among countries that are politically influential vis-à-vis the IMF.

Mexico perhaps offers the clearest example of a country subject to asymmetrical moral hazard. Because of its geographical location in North America, Mexico has deep economic ties with the United States in trade, investment, and financial flows.[20] US policymakers often worry that a disorderly Mexican crisis would trigger large cross-border migrant flows.[21] The formal and informal influence of the US in the IMF means that Mexico can typically expect generous treatment by the institution. For example, Mexico received rapid support during the 1994 Mexican crisis, when the IMF assembled a $30 billion emergency loan package on top of the $20 billion support

18. Frankel and Roubini 2002; Vaubel 1983.
19. Steinwand and Stone 2008 provide a good overview.
20. Villarreal 2017.
21. For example, De Long, De Long, and Robinson 1996.

promised by the US.[22] Despite high levels of exposure, US financial institutions emerged relatively unscathed: for example, there were no credit agency downgrades of US financial institutions in 1994 citing the Mexican crisis.[23]

TABLE 1. *Predictions*

Country's political influence vis-à-vis the IMF (degree of moral hazard)	
High ⟷	Low
• Frequent IMF lending • Weak conditionality • Small international reserves • Frequent financial crises	• Infrequent IMF lending • Stringent conditionality • Large international reserves • Infrequent financial crises

Mexican authorities have also exhibited behavior consistent with asymmetrical moral hazard. Mexican reserves did not increase after IMF intervention in 1994: Mexico chose not to pursue self-insurance despite experiencing a major crisis.[24] Instead, Mexican authorities have turned repeatedly to the IMF. Between 1952 and 2009, Mexico initiated a new IMF program about once every six years.[25] Only five years after the Mexican crisis, Mexican authorities entered into an IMF program in response to instability triggered by the 1998 Asian crisis.[26] During the 2008 global financial crisis, Mexico became the first country to express interest in the IMF's Flexible Credit Line (FCL), a short-term loan lacking the stringent requirements typical of longer-term IMF loans, and it was granted a $47 billion credit line less than a month after application. The FCL arrangement was renewed repeatedly and remains in place as of 2018.[27]

The experience of East Asian countries since the 1997–1998 Asian financial crisis offers a useful contrast.[28] During the crisis, many regional policymakers felt that the IMF systematically ignored their views and imposed inappropriate policy measures

22. "Use of the Exchange Stabilization Fund to Provide Loans and Credits to Mexico," Memorandum to Edward S. Knight, General Counsel, Treasury Department, 2 March 2005. Retrieved from US Department of Justice, <www.justice.gov/sites/default/files/olc/opinions/1995/03/31/op-olc-v019-p0083.pdf>.

23. Van Rijckeghem and Weder 2000.

24. Reserves in months of imports for Mexico averaged 4.2 in the decade before 1994, compared to 2.9 in the decade thereafter.

25. Reinhart and Rogoff 2009.

26. International Monetary Fund, "Letter of Intent of the Government of Mexico," 15 June 1999, retrieved from <https://www.imf.org/external/np/loi/1999/061799.htm>.

27. Columbia and Poland also entered into FCL arrangements. International Monetary Fund, "IMF Lending Arrangements as of June 30, 2017," retrieved from <http://www.imf.org/external/np/fin/tad/extarr11.aspx?memberKey1=ZZZZ&date1key=2017-02-28>.

28. As we discuss in the empirical section, the experience of East Asian countries likely reflects variation in the political influence variables associated with our theory rather than geographically targeted regional bias by the IMF.

preferred by the US and European states.[29] Delays in IMF disbursement prompted nations with ailing economies to question the fund's ability to deal with international economic emergencies swiftly and effectively.[30] Japanese financial institutions, which were heavily exposed to the crisis economies, suffered serious losses: Moody's downgraded all major Japanese banks in 1997–98 explicitly citing exposure to the Asian crisis.[31]

Underlying East Asian skepticism toward the IMF is the perception that the institution poorly reflects the region's interests. Formal underrepresentation in the IMF has been a major diplomatic concern for East Asian states: voting power in the institution underweights the region compared to the West.[32] East Asian states are also underrepresented in terms of nationals among IMF staff.[33] The region's economic ties are heavily tilted toward Japan, and more recently China, which themselves exercise relatively weak informal influence over the institution's policies.[34] For these reasons, government officials in East Asia have argued that the IMF does not appropriately reflect their preferences and often imposes excessively harsh conditionality compared to other potential borrowers.[35]

Their perceived lack of influence in the IMF has compelled many East Asian countries to pursue self-insurance through precautionary reserve accumulation.[36] A Japanese Ministry of Finance official noted that, after the Asian crisis, "each country wants to have its own insurance policy and not rely on the IMF."[37] John

29. Grimes 2008; Lee 2006; Lipscy 2003.

30. "Asia, the Financial Crisis, and Global Economic Governance," Speech by John Lipsky, First Deputy Managing Director of the International Monetary Fund at the Federal Reserve Bank of San Francisco Conference, Santa Barbara, California, 20 October 2009. Retrieved from <https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp102009>.

31. Van Rijckeghem and Weder 2000.

32. For example, ASEAN+3 accounts for about 26 percent of world GDP in nominal terms and 29 percent in terms of purchasing power parity (PPP), but the region's share of IMF voting rights is only 18 percent. These figures are based on IMF Voting shares as of 19 April 2017 and GDP as of 2015. The numbers reflect reforms implemented in the Fourteenth General Review of Quotas, which was intended to mitigate underrepresentation of developing countries, such as those in Asia. Prior to these reforms, underrepresentation relative to GDP was more severe.

33. For example, ASEAN+3 has only a 12 percent share of IMF staff, compared to 24 percent for the US and 30 percent for Europe. Calculated from *IMF Diversity and Inclusion Annual Report*, 2013. Retrieved from <https://www.imf.org/external/np/div/2013/index.pdf>.

34. Lipscy 2017, chapter 4.

35. To be sure, Asian countries are not entirely without voice within the IMF. Despite underrepresentation, they constitute a nontrivial voting bloc if they can act in concert within the institution. There is also some intraregional variation in informal influence over the IMF. South Korea is arguably in a position of relative privilege in the institution, with a security alliance and significant economic relations with the United States. Despite domestic criticism, the Korean bailout in 1997 was the largest at the time and came with relatively soft conditions. We thank an anonymous reviewer for suggesting these caveats.

36. Another avenue has been the creation of regional swap agreements—the Chiang Mai Initiative and Chiang Mai Initiative Multilateralization, though these mechanisms have not been utilized in practice. See discussion in Grimes 2011.

37. "Why Is Asia Building a Cache of Dollars? Asean+3 Will Breathe New Life into 'Dead' Asian Monetary Fund Proposal When They Meet on the Sidelines of the ADB's Annual Meeting in May," *The Business Times Singapore*, 10 March 2005.

Lipsky, first deputy managing director of the IMF, agreed that "Global economic efficiency would have been enhanced if the IMF had been able to provide the insurance demanded by [Asian] countries, but doubts about the amount of available financing and the conditions attached to this financing have encouraged self-insurance."[38]

In contrast to Mexico, Asian countries have shied away from the IMF after the 1997–98 crisis. During the 2008 global financial crisis, of thirty emerging economies that received IMF financing, none were from East Asia. Several regional countries that came under pressure publicly ruled out IMF support and instead sought bilateral swaps from the US Federal Reserve.[39] Thai Finance Minister Korn Chatikavanij publicly noted that the IMF remains heavily stigmatized in the region.[40]

Expanding on this illustrative discussion, the next section provides a general test of our propositions. We demonstrate that our theoretical propositions are supported in a panel data set covering 130 countries from 1980 to 2010. Our findings show that countries that can expect to receive favorable treatment from the IMF typically hold lower levels of reserves and experience financial crises more frequently. We then move to consider causal mechanisms, focusing on the expulsion of Taiwan from the IMF in 1980.

Panel Analysis

To test our predictions, we need to proxy for a country's expected influence vis-à-vis the IMF. Existing quantitative analyses of the determinants of IMF lending have used several different measures to quantify political influence. These have typically focused on the possibility that IMF lending might be biased indirectly by a borrower's ties to the US or major European countries. For example, IMF lending appears to be influenced by a country's diplomatic and economic ties to the US or major European countries as expressed by proximity of voting profile in the UN General Assembly,[41] intensity of trade,[42] and bank exposure.[43] Other studies suggest that borrowers may exert influence over the IMF more directly if their nationals make up a large share of IMF employees or they hold a large share of voting power.[44]

Existing work has generally analyzed these proxies in varying combinations, which has often produced inconsistent or contradictory results.[45] One potential

38. "Asia, the Financial Crisis, and Global Economic Governance," Speech by John Lipsky.
39. Broz 2015.
40. Sandrine Rastello Istanbul, "Drive to Recast IMF Faces Trust Obstacle; Rich Nations 'Pilot Too Much'" *The Star,* 8 October 2009.
41. Thacker 1999.
42. Barro and Lee 2005.
43. Broz and Hawes 2006; Lipscy 2017; Oatley and Yackee 2004.
44. Barro and Lee 2005; Lipscy 2017.
45. For example, while Thacker 1999 and Oateley and Yackee 2004 find that General Assembly voting is a useful predictor of IMF lending, Broz and Hawes 2006 find no evidence of this. Thacker 1999 and Bird and Rowlands 2001 find that exports from the US are negatively related to IMF lending, while Barro and

problem is that these variables are intended to proxy for the same underlying concept —the expected political bias of the IMF in favor of a borrower country—and are also relatively highly correlated with each other.[46] One way to address this issue is to derive a composite measure that draws information from several underlying proxy variables. We use Principal Component Analysis (PCA)[47] to construct a single-dimension independent variable from eight different variables that have been identified in previous work as plausible proxies for influence over the IMF: number of nationals employed as IMF economists, IMF quota share, UN affinity score with the US and European powers, trade volume with the US and Europe, and US and European bank lending.[48] Data sources and details for all variables used in our empirical analysis are available in the online appendix. We interpret higher values of the resulting single-dimension independent variable—IMF INFLUENCE—as indicative of greater potential influence over the IMF.

We retain one principal component from the PCA analysis for several reasons. Retaining a single factor is supported by visual inspection of a Scree plot.[49] The first principal component is also positively correlated with all eight of the original variables, making it a plausible proxy for our theoretical notion of IMF influence, while all other principal components are associated with only a subset of variables with no obvious intuitive interpretation. To consider the possibility that the second component captures a different aspect of influence over the IMF, we also reran the empirical models including two components as explanatory variables, and the coefficient for the second component was inconsistent and generally indistinguishable from zero.

Because the political determinants of IMF lending have been evaluated extensively elsewhere, we focus here on validating our PCA measure. To establish that IMF INFLUENCE is a plausible measure of the likelihood of favorable IMF treatment, we replicate and extend the findings from Barro and Lee, who examined a variety of potential determinants of IMF lending.[50] The panel data set contains information on 130 countries in five-year increments, that is, 1980–1985, 1985–1990, etc., and we extended the original data over time to encompass 1980–2010. We follow Barro

Lee 2005 find a positive association between IMF lending and trade intensity with the US. In addition, although Barro and Lee 2005 find that employment of home country nationals among IMF economists is a useful predictor of IMF lending, the variable is excluded from most other studies. Also see discussion in Steinwand and Stone 2008.

46. All of the proxy variables we use are positively correlated, and several exhibit particularly high correlations, such as share of IMF staff and IMF voting power (0.8) and US and European bank lending (0.7). See discussion of multicollinearity in Belsley, Kuh, and Welsch 2004.

47. Dunteman 1989.

48. Since ties with minor European countries are unlikely to bring favorable treatment from the IMF, we use average values for all of these variables based on the three largest economies and geopolitical powers in Western Europe: France, Germany, and the United Kingdom. For the Bank for International Settlements (BIS) bank-lending data, years prior to 1983 are unavailable. Hence, we use the values for 1983–1985 for the 1980–1985 period. The UN affinity scores are from Gartzke 2010.

49. Bryant and Yarnold 1995. There is a sharp drop-off in the Eigenvalue between component 1 and component 2 (2.3), which is much larger than subsequent drop-offs (<0.41).

50. Barro and Lee 2005.

and Lee in using five-year increments because some data, such as representation among IMF personnel, are not available on a yearly basis. Throughout the empirical analysis, independent variables are coded at the beginning of each period, while dependent variables are coded as average levels over the five-year period.

The dependent variables are indicators of IMF lending outcomes: the size of IMF loans as a share of the receiving country's GDP averaged over each five-year period, the fraction of months during each five-year period that a country operated under an IMF loan program,[51] and a dichotomous indicator for approval of any new IMF programs during the five-year period.[52] Since lending outcomes may be affected by demand-side factors, we also include a variable that proxies for the stringency of IMF conditionality—the combined total number of prior actions required for loan disbursement, performance criteria, and benchmarks/targets.[53]

Following Barro and Lee, we use Tobit specifications[54] for the bounded dependent variables to avoid potential bias from censoring.[55] For the dichotomous approval variable, we use probit.[56] We use the economic controls for determinants of IMF lending from Barro and Lee in all statistical models, measured at the beginning of each five-year period: per capita GDP, GDP, the lagged GDP growth rate,[57] international reserves as a proportion of imports, and a dummy variable indicating membership in the OECD. The squares of per capita and absolute GDP are included to account for any nonlinear relationship between those variables and IMF lending. As Barro and Lee note,[58] other economic variables, such as magnitude of current account deficits and inflation, are not meaningful predictors of IMF lending once lagged GDP growth and international reserves are included.[59] We also include dummy variables for each five-year period to control for period-specific effects and report country-clustered standard errors.[60] Absolute, continuous variables are logged to avoid undue influence of outliers.

51. For example, if a country had an IMF program for the entire period, this variable would be 1. If it had a program for fifty-seven out of sixty months, the variable would be 57/60 = 0.95, etc.

52. Barro and Lee 2005.

53. Copelovitch 2010a and Dreher, Sturm, and Vreeland 2015.

54. Amemiya 1984.

55. For example, IMF lending and the total number of conditions is bounded by zero at the lower limit. Hence, the Tobit specification is:

$$L_{it}* = \alpha + \beta X_{it} + \delta * time_t + u_{it}, L_{it} = \max[0, L_{it}*],$$

whereas program participation is bounded between zero and one, hence the specification is: $P_{it}* = \alpha + \beta X_{it} + \delta * time_t + u_{it}$, $P_{it} = \min[1, \max(0, P_{it}*)]$, where L_{it} and P_{it} are the relevant dependent variables, the vector X_{it} denotes country-specific independent variables as shown in the regression tables and footnotes, and u_{it} is a random error term. "$time_t$" denotes period dummies to control for common external factors such as world macroeconomic conditions.

56. That is, $A_{it}* = \alpha + \beta X_{it} + \delta * time_t + u_{it}$, $A_{it} = 1$ if $A_{it}* > 0$ and $A_{it} = 0$ if $A_{it}* \leq 0$. Variable definitions are analogous to those in the previous footnote.

57. That is, for the previous five-year period.

58. Barro and Lee 2005.

59. Ibid.

60. We also tried substituting cubic polynomials as suggested by Carter and Signorino 2010, and the results were very similar.

The results appear in Table 2. The first three columns show that the IMF INFLUENCE variable is associated, as predicted, with larger IMF loans as a share of GDP, higher rates of participation in IMF programs, and a greater likelihood of IMF loan approval. The fourth column shows that, subject to receiving an IMF program, the IMF INFLUENCE variable is negatively associated with the total number of conditions. In other words, greater influence over the IMF is associated with more generous and frequent lending from the IMF and fewer conditions. These results provide support for our premise that the IMF INFLUENCE variable is a reasonable proxy for political clout vis-à-vis the IMF.

TABLE 2. *Evaluating the plausibility of the IMF influence variable, 1980–2010*

	Tobit: IMF loan to GDP ratio (%)	*Tobit: IMF participation rate*	*Probit: IMF loan approval*	*Tobit: Total number of IMF conditions*
IMF INFLUENCE	1.27*	0.28*	0.55*	−4.00*
(PCA VARIABLE)	(0.33)	(0.07)	(0.18)	(1.94)
GDP	0.64	0.40*	0.94*	32.94*
	(0.57)	(0.14)	(0.32)	(10.83)
GDP^2	−0.06	−0.02*	−0.05*	−1.43*
	(0.03)	(0.01)	(0.02)	(0.51)
GDP PER CAPITA	0.57*	0.15*	0.38*	−1.52
	(0.17)	(0.04)	(0.11)	(1.95)
GDP PER $CAPITA^2$	−0.07*	−0.02*	−0.05*	0.23
	(0.02)	(0.01)	(0.01)	(0.24)
ANNUAL PER CAPITA	−0.14*	−0.03*	−0.05*	−0.58
GDP GROWTH	(0.04)	(0.01)	(0.02)	(0.34)
RESERVES	−0.16*	−0.03*	−0.09*	−0.41
	(0.06)	(0.01)	(0.03)	(0.41)
OECD	−1.59	−0.50*	−1.22*	18.66*
	(1.11)	(0.23)	(0.55)	(4.00)
Constant	−0.24	−1.53*	−4.12*	−116.39*
	(2.71)	(0.65)	(1.47)	(53.53)
Observations	517	522	522	93

Notes: All independent variables are measured at the beginning of the five-year period. Country-clustered standard errors in parentheses. Asterisk denotes a coefficient at least two standard errors removed from 0. Control variables included in the models but not shown in the table: time period dummies. Observations are in five-year increments (e.g., 1980–1985). IMF-loan GDP ratio is the size of IMF loans as a share of the receiving country's GDP averaged over each five-year period. IMF participation rate is the fraction of months during each five-year period that a country operated under an IMF loan program. IMF loan approval is a dichotomous variable coded as 1 if the IMF approved any new program for the country during the five-year period. Total number of IMF conditions (TC) is measured as the sum of prior actions (PA), performance criteria (PC), and benchmarks/targets (BT).

We now turn to our main analysis. For consistency, we use the same data set covering 130 countries from 1980–2010 we described earlier. Our theoretical prediction is that countries in a position to exert greater influence over the IMF will be more susceptible to moral hazard. These countries are less likely to pursue self-insurance through reserve holdings, and because financial institutions and government policymakers will be more willing to pursue risky behavior, the likelihood of financial crises should be higher. In comparison, countries that have limited leverage over the IMF cannot expect generous treatment in the event of a crisis. Such countries

should exhibit a relatively stronger tendency to accumulate reserves for self-insurance and a lower likelihood of crises.

Endogeneity should not be a major concern for the independent variables we use to derive the PCA measure. UN voting affinity and share of IMF staff are unlikely to be affected by a country's reserves or crises. For the other variables, any potential endogeneity will bias the results *against* findings consistent with our predictions: (1) IMF quotas are, in principle, determined by formulas that include reserves as one input. However, insofar as reserves affect quotas, the relationship should be a positive one, creating a bias against findings consistent with our prediction that countries with high quotas hold a lower level of reserves. (2) Similarly, countries that are seen as risky—holding low reserves and frequently experiencing crises—should attract less, not more, economic ties in the forms of trade and bank lending. In addition, we measure the independent variables at the beginning of each five-year period, while the dependent variables are measured as period averages.

The dependent variable is foreign reserves as a share of GDP.[61] As with IMF lending, we use Tobit specifications since the dependent variable is bounded at zero: OLS specifications produce substantively similar results.[62] The results are presented in Table 3. In the first column, we include only our key independent variable, IMF INFLUENCE. In the second column, we include the basic macroeconomic controls used earlier: GDP and GDP PER CAPITA and their squares, GDP ANNUAL growth, and a dummy for OECD membership. In both specifications, IMF INFLUENCE is statistically significant and negatively associated with reserve holdings.

The third column includes several additional variables that might be plausibly associated with reserve holdings: the CPI inflation rate, exports, imports, a dichotomous indicator for a currency peg, and a measure of currency undervaluation. Several of these variables are potentially endogenous to government decisions over reserves and should be interpreted with caution. It could be problematic to include these variables in our model because a government that wishes to accumulate reserves for precautionary purposes can do so by weakening the exchange rate and running a current account surplus—we would be effectively controlling for variables that are a consequence of our key explanatory variable.[63] However, since mercantilism is the leading alternative explanation for reserve accumulation,[64] it is helpful to examine whether

61. We also reran all of the specifications using reserves in months of imports and produced substantively similar results (across all models, the PCA measure is significant at a level of 0.05 with the exception of Model 1, where it is significant at a level of 0.1). The dependent variable is logged.

62. The Tobit specification is:

$$R_{it}* = \alpha + \beta X_{it} + \delta * time_t + u_{it},\ R_{it} = \max[0, R_{it}*],$$

where R_{it} is the dependent variable, the vector X_{it} denotes country-specific independent variables as shown in the regression tables and footnotes, and u_{it} is a random error term. "$time_t$" denotes period dummies to control for common external factors such as world macroeconomic conditions.

63. King, Keohane, and Verba 1994.

64. Aizenmann and Lee 2005; de Beaufort, Onno, and Sondergaard 2007; Dooley, Folkerts-Landau, and Garber 2003.

TABLE 3. *IMF influence and self-insurance (reserves/GDP), 1980–2010*

Dependent variable: Reserves/GDP

	Tobit	*Tobit*	*Tobit*	*Tobit*	*Tobit*	*Fixed Effects OLS*
IMF INFLUENCE	−0.10*	−0.14*	−0.17*	−0.16*	−0.16*	−0.10*
(PCA VARIABLE)	(0.02)	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)
GDP		−0.06	−0.13	−0.09	−0.16	−0.60
		(0.17)	(0.21)	(0.22)	(0.22)	(0.79)
GDP^2		0.004	0.01	0.01	0.01	0.06
		(0.009)	(0.01)	(0.01)	(0.01)	(0.03)
GDP PER CAPITA		0.06*	0.03	0.03	0.03	−0.24*
		(0.02)	(0.02)	(0.02)	(0.02)	(0.06)
GDP PER $CAPITA^2$		−0.002*	−0.001	−0.001	−0.001	0.004*
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ANNUAL PER CAPITA GROWTH		0.03*	0.02	0.02	0.03	0.01
		(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
OECD		−0.27	−0.11	−0.08	−0.05	0.58*
		(0.24)	(0.14)	(0.14)	(0.14)	(0.23)
INFLATION			−0.05	−0.05	−0.05	−0.06
			(0.05)	(0.05)	(0.05)	(0.03)
EXPORT			0.05	0.01	−0.25	−0.03
			(0.40)	(0.41)	(0.40)	(0.46)
IMPORT			1.31*	1.27*	1.62*	0.39
			(0.42)	(0.42)	(0.42)	(0.45)
CURRENCY VALUATION			0.14	0.13	0.18	−0.25*
			(0.15)	(0.15)	(0.14)	(0.09)
PEG			−0.16*	−0.16	−0.15	0.01
			(0.08)	(0.08)	(0.08)	(0.06)
EAST ASIA				0.14		
				(0.15)		
OIL EXPORTER					0.36	
					(0.20)	
Constant	3.36*	3.36*	2.67*	2.57*	2.72*	3.37
	(0.10)	(0.86)	(1.12)	(1.12)	(1.16)	(4.83)
Observations	549	539	421	421	421	421

Notes: Controls included in the models but not shown in the table: time period dummies. Asia and Oil Exporter are omitted from the fixed effects model because of limited temporal variation. Observations are in five-year increments (e.g., 1980–1985, 1985–1990), with reserves measured as a five-year average. All independent variables are measured at the beginning of the five-year period. Country-clustered standard errors in parentheses. Asterisk denotes a coefficient at least two standard errors removed from 0.

the substantive effect we find runs entirely through the exchange rate and trade channels. The results show that IMF INFLUENCE remains negative and statistically significant even after controlling for these variables.

In the last three columns, we add additional control variables to make sure our results are not biased by unique group- or country-specific factors. To make sure our results are not completely contingent on the East Asian dynamics described in the previous section, we reran the model including a dummy variable for the region.[65] To account for oil-exporting countries, which tend to hold a high level of

65. We also tried dropping East Asia from the data, and the substantive results remained unchanged. These results suggest the conventional notion that East Asia as a region was treated particularly harshly

reserves for orthogonal reasons, we included a dummy variable for oil exporters. Finally, in the last column, we reran the analysis including country fixed effects to account for any unobserved country-specific factors that might affect the level of reserves.[66] Since fixed effects in Tobit models tend to produce biased estimates, we use OLS for this specification.[67] In all cases, IMF INFLUENCE remains negatively and significantly associated with reserves.[68]

We predict that expectations of favorable treatment by the IMF generate moral hazard. One manifestation of this is that countries forgo self-insurance, holding lower levels of foreign reserves. Countries may also pursue more risky policies, such as loosening financial regulations or promoting short-term capital inflows. Expectations of greater IMF leniency will also affect the risk assessments of private financial institutions, which may lend more aggressively to a country believed to be well-positioned vis-à-vis the IMF. The upshot is that heightened risk taking and insufficient self-insurance should make such countries more likely to experience banking and currency crises.

We therefore examine whether higher IMF influence leads to the more frequent incidence of crises. The banking and currency crisis variables we use are dichotomous, with 1 indicating any occurrence of a crisis during the relevant five-year period, and 0 otherwise.[69] Because the dependent variable is dichotomous, we use logit specifications. Across all models, we include country and time period fixed effects to account for unobserved sources of country-specific and temporal variation in crisis incidence.

Table 4 presents the results. The first and second models include only the key independent variable, IMF INFLUENCE. For both banking and currency crises, IMF INFLUENCE is positively associated with crisis incidence. The third and fourth columns show that this relationship remains robust to the inclusion of macroeconomic controls considered earlier.[70] Finally, the fifth and sixth columns include additional control variables that are potentially endogenous to moral hazard concerns as

by the IMF is an oversimplification and likely reflects the consequences of the other variables included in the model.

66. We omit the East Asia and oil exporter dummies from this analysis because they exhibit limited temporal variation.

67. See discussion in Barro and Lee 2005 and Wooldridge 2002.

68. To examine whether any particular underlying subcomponent of IMF INFLUENCE is exerting disproportionate leverage over these results, we reran the sparse model from Table 3 using each of the eight underlying variables as the sole independent variable. Since our premise is that each variable is a noisy measure of IMF influence, we do not necessarily expect each to be consistently and significantly associated with the outcome variables. However, all of the underlying variables were negatively associated with reserves, and only European UN affinity was not statistically significant. These results are available in appendix Table A1.

69. Data from Reinhart and Rogoff 2009.

70. We omit the OECD dummy because it exhibits very little temporal variation and is not meaningfully estimated in several models. Running the models including the OECD dummy does not change the substantive results (the PCA measure is significant at the 0.05 level across all models except for Model 4, for which $p = 0.06$).

discussed earlier. In all model specifications, IMF INFLUENCE is associated with a higher likelihood of financial crises.

TABLE 4. *IMF influence and financial crises, 1980–2010*

	Logit: banking crisis	*Logit: currency crisis*	*Logit: banking crisis*	*Logit: currency crisis*	*Logit: banking crisis*	*Logit: currency crisis*
IMF INFLUENCE	0.62*	0.49*	0.70*	0.42*	0.64*	0.57*
(PCA VARIABLE)	(0.18)	(0.17)	(0.22)	(0.21)	(0.24)	(0.26)
GDP			4.42	3.22	7.22	7.57
			(4.07)	(4.70)	(4.89)	(5.83)
GDP^2			−0.21	−0.15	−0.34	−0.28
			(0.17)	(0.19)	(0.21)	(0.24)
GDP PER CAPITA			−0.07	0.50*	0.04	0.65*
			(0.22)	(0.23)	(0.25)	(0.27)
GDP PER $CAPITA^2$			0.002	−0.006	0.001	−0.010
			(0.004)	(0.004)	(0.004)	(0.005)
ANNUAL PER			−0.14*	−0.24*	−0.12	−0.17
CAPITA GROWTH			(0.07)	(0.08)	(0.08)	(0.09)
INFLATION					0.69	0.79
					(0.41)	(0.49)
EXPORT					0.02	−1.11
					(2.55)	(2.90)
IMPORT					1.39	−0.83
					(2.91)	(3.48)
CURRENCY					−0.32	1.14
VALUATION						
					(0.57)	(0.77)
PEG					−0.06	−0.62
					(0.39)	(0.45)
Observations	339	285	329	281	297	254

Notes: Models include time period and country fixed effects. Observations are in five-year increments (e.g., 1980–1985), with crises coded as 1 if any crisis occurs during the period. All independent variables are measured at the beginning of the five-year period. Asterisk denotes a coefficient at least two standard errors removed from 0.

As a robustness check, we reran the specifications after recoding the dependent variable as "twin crises,"[71] cases in which banking and currency crises occur simultaneously. Similarly, we considered whether IMF INFLUENCE is associated with the incidence of "financial crises" more broadly defined, by coding a dummy variable for the incidence of any crisis type examined by Reinhart and Rogoff[72]—banking crisis, currency crisis, sovereign debt default, inflation crisis, and market crashes. IMF INFLUENCE is positively and significantly associated with financial crises according to these alternative indicators.[73] We also included several domestic political variables

71. Kaminsky and Reinhart 1999.
72. Reinhart and Rogoff 2009.
73. This is primarily because of the strong association between IMF INFLUENCE and a subset of crisis types: banking and currency crises and market crashes. IMF INFLUENCE is more weakly associated with sovereign default and inflation crises, though generally signed correctly for inflation crises. One possible reason for

that have been found to be meaningful predictors of currency crises in existing work—democracy, divided government, and turnover.[74] These alternative specifications did not alter the substantive results: the relationship between IMF INFLUENCE and the incidence of crises remained positive and statistically significant.

Finally, as an additional robustness check, we reran our empirical models using bank lending from financial institutions in the United States and major European countries as a proxy for expected influence over the IMF. Bank exposure is a conventional proxy for IMF influence widely used in existing literature.[75] By using the variable in lieu of our PCA variable, we can demonstrate that our findings are not driven by the use of a "new" independent variable to capture a country's expected influence over the IMF.

Bank exposure is measured as the bank lending a country receives from a specific source as recorded by the BIS. For European countries, we use combined lending from France, Germany, and the UK since these are the largest international lenders in Europe and likely to hold the most sway in the IMF.[76] Because the US and major European countries exert asymmetrical influence over the IMF, we expect that moral hazard should be a greater problem among countries receiving large amounts of bank lending from the US and Europe. This should be reflected in a lower tendency to self-insure through reserve holdings, as well as more frequent incidence of financial crises. We also include banking lending from Japan, which has traditionally been the other major source of international bank lending, but is a country that has been historically underrepresented and unable to exert influence within the IMF.[77] Because of this, we do not expect high exposure from Japanese financial institutions to generate moral hazard.

The results, summarized in the online appendix (Table A5 and A6), provide additional support for our theoretical expectations that IMF moral hazard is distributed unevenly across the world economy. Countries with strong financial ties to the US and Europe tend to hold a lower level of reserves and have more frequently experienced crises. In contrast, bank exposure from Japan is not meaningfully associated with reserves or the incidence of crises. We conducted all robustness checks

this is the differences in coding between sovereign debt default and other crisis types. As Reinhart and Rogoff 2009 (chapter 1) discuss, a currency or banking crisis can occur when there is a large movement in exchange rates (15% against USD or anchor currency) or widespread bank runs, that is, what might be considered early stages of such crises. On the other hand, a sovereign default is coded to have occurred only when a government defaults on either external or domestic debt obligations (including deposit freezes or forcible conversions in the latter case). It is possible that countries with strong ties to the IMF more frequently experience *difficulties* with public debt, but are able to avoid outright default by receiving support from the IMF. We do observe a positive association between IMF INFLUENCE and total debt service, which is consistent with this possibility.

74. Leblang and Satyanath 2006, 2008.

75. Broz and Hawes 2006; Copelovitch 2010b; Lipscy 2017; Stone 2011.

76. For example, these countries have consistently been the top three European nations according to IMF voting power.

77. Lipscy 2015a.

described earlier in reference to Table 3 and Table 4, and the substantive results remained unchanged.[78]

Causal Mechanisms: Taiwan

In this section, we evaluate our proposed causal mechanisms by leveraging Taiwan's unique history with the IMF. Taiwan is an extreme example of the biased international insurance system created by the politics of the IMF. Taiwan was expelled from the IMF in April 1980 against its will for exogenous political reasons and it is the only major economy that is not an IMF member.[79] Taiwan is a useful counterfactual case because it cannot expect *any* support from the IMF despite its deepening integration with the world economy. We show that Taiwan's expulsion from the IMF led to a policy shift consistent with our theoretical predictions: Taiwanese authorities sharply increased international reserves and maintained conservative regulatory policies to shield its economy from potential crises.

Taiwan's Expulsion from the IMF

One of the challenges of causal inference when considering IMF moral hazard is the nature of the institution's membership. IMF membership is now essentially universal, with minor exceptions such as Cuba, North Korea, and several microstates.[80] Most changes in membership status have occurred as a result of self-selection, making it probable that changes in reserves associated with membership status are at least in part caused by domestic policy changes. For example, a large influx of new members occurred after the end of the Cold War, when post-communist transition coincided with IMF membership.[81] Changes in relations vis-à-vis the IMF tend to be gradual, reflecting the evolution of voting power or diplomatic and economic ties with influential states.

Taiwan provides an important opportunity to evaluate our proposed causal mechanisms. Taiwan is the only major economy that is not an IMF member. This is a legacy of diplomatic competition with the People's Republic of China, which resulted in Taiwan's expulsion from the IMF in April 1980. Under the "One

78. See replication file for details. In a few models, the coefficient on the key variable (financial ties to the US and Europe) remained signed correctly but was estimated with marginally less precision than those reported in Table A5 and A6.

79. The other notable nonmembers are Cuba and North Korea, which are much smaller, less globally integrated economies.

80. A full membership list is available at "List of Members," International Monetary Fund, Washington, DC, retrieved from <https://www.imf.org/external/np/sec/memdir/memdate.htm>.

81. Analogously, Chinese entry into the IMF in 1980 went hand in hand with domestic economic reforms initiated under Deng Xiaoping. While Taiwan's expulsion is useful for causal inference, Chinese entry reflects self-selection and is less useful.

China" principle of the People's Republic of China,[82] Chinese entry into the IMF was predicated on the exit of Taiwanese representatives. For this reason, Taiwan is a unique counterfactual case of a major, globally integrated economy without any prospect of being subject to IMF moral hazard.

Taiwanese expulsion from the IMF in April 1980 presents several attractive features for the purposes of causal inference. First, Taiwan's exit represents a sharp disjuncture, immediately and dramatically altering the country's relationship with the IMF. Prior to its expulsion, Taiwan enjoyed a relatively privileged position within the IMF: though not large in absolute terms, Taiwan was overrepresented according to voting power and share of IMF staff,[83] and it enjoyed close political and economic ties with the United States, which exercises outsized informal influence.[84] After April 1980, Taiwan could expect no help from the IMF in the event of financial difficulties. As George P. Nicoletopoulos, the director of the IMF's legal department, noted on the eve of Taiwan's departure, expulsion meant that "all official relations under the Articles of Agreement with the Taiwanese authorities would cease."[85] Informal ties have also been largely precluded by subsequent Chinese intransigence. US government officials of the American Institute in Taiwan, the de facto embassy, confirm that there are no arrangements, formal or informal, for an IMF bailout of Taiwan in the event of a financial crisis.[86]

Second, the expulsion of Taiwan was involuntary and hence not subject to self-selection. Taiwanese authorities preferred to remain IMF members if possible, but they were removed by a vote of the executive board, which switched Taiwan's credentials to China.[87] Thus, Taiwan's change in status from an IMF member to nonmember is not attributable to any domestic policy shift. Taiwan's shift from import-substitution industrialization to export-oriented industrialization, a domestic policy change that might have plausibly led to greater reserve accumulation, took place much earlier in 1958–1960.[88]

82. Li 2006, 598–99.

83. In 1980, Taiwan's GDP share among IMF members was 0.6 percent, while its voting power in the IMF was 1.4 percent. This reflected the fact that IMF quotas heavily overrepresented Taiwan's share at inception in 1946, when its quota was calculated based on the size of China's entire economy including the mainland (figures calculated based on Maddison 2010 and Boughton 2001, 856). Although Taiwan agreed to forgo subsequent quota increases, its initial allocation kept it overrepresented and allowed it to appoint an executive director until 1972. Taiwan's share of IMF staff was 1.1 percent, which exceeded both its GDP share and population share among IMF members. Boughton 2001, 979; IMF 1980, 100; Maddison 2010.

84. Stone 2011. Until 1979, Taiwan was a formal US ally and the US provided extensive economic support to Taiwan though various bilateral and multilateral programs. See Baldwin, Chen, and Nelson 1995, 14.

85. Boughton 2001, 979.

86. Meeting with US officials in the American Institute in Taiwan, July 2011.

87. Boughton 2001, 979.

88. In 1958, Taiwan introduced a policy package that included currency devaluation and a unified exchange rate as well as the introduction of export incentives and the removal of import restrictions. World Bank 1993. This was followed by the Nineteen Point Program for Economic and Financial

Third, the disposition and precise timing of Taiwan's expulsion were uncertain ex ante. China had displaced Taiwan in major United Nations agencies in the early 1970s by securing majority support, primarily among developing countries.[89] In 1973, Chinese Minister of Foreign Affairs Ji Pengfei sent a formal notice to the heads of the IMF and World Bank requesting the expulsion of the "KMT counterrevolutionary clique."[90] However, the weighted voting rules of the IMF gave large economies, such as the United States, leverage to resist the credentials change.[91] In addition, Chinese policymakers were somewhat ambivalent about membership—they feared a lack of influence under the weighted voting scheme and the economic obligations that would come with IMF membership.[92] Diplomatic negotiations dragged on through the 1970s. As late as March 1980, less than a month before Taiwan's ultimate expulsion, US officials were engaged in negotiations with China to continue Taiwan's membership based on the "Olympic Model" in which Taiwanese membership would be maintained under a different name and national symbols.[93] It was possible that Taiwan's membership would continue as it ultimately did in the Asian Development Bank, where resistance from the US and Japan resulted in a joint membership arrangement in 1986 that renamed Taiwan as "Taipei China."[94]

Synthetic Control

We use the synthetic control method to examine the trajectory of international reserves in Taiwan before and after expulsion from the IMF. Synthetic control overcomes some of the problems associated with comparative case studies through data-driven construction of a control case that closely resembles the treated case of interest.[95] The method was first used to analyze the economic impact of terrorism in the Basque country,[96] and has since been applied to examine the effects of a wide range of political changes such as German reunification[97] and economic

Reform, which formally instituted export-oriented policies such as liberalization of market controls and export promotion. Rigger 2013, 49; Van Dijck, Verbruggen, and Linnemann 1987, 49; Zhang 2003.

89. Lipscy 2017, chapter 9.

90. Jacobson and Oksenberg 1990, 63.

91. For example, see the US government internal assessment of Taiwan's position in the IMF in the Memorandum from the Country Director for the Republic of China (Shoesmith) to the Assistant Secretary of State for East Asian and Pacific Affairs (Green) 1971, US National Archives, RG 59, Central Files 1970–73, UN 6 CHINAT. Available at <https://history.state.gov/historicaldocuments/frus1969-76v05/d331>.

92. Jacobson and Oksenberg 1990, 64.

93. Summary of Conclusions of a Presidential Review Committee Meeting, NSC Institutional Files (H-Files), Box 79, Prc 136, US–China Economic Relations, 27 March 1980, Carter Library, Atlanta, GA. <https://history.state.gov/historicaldocuments/frus1977-80v13/d305>.

94. Chiu 1982, 230.

95. Abadie, Diamond, and Hainmueller 2010.

96. Abadie and Gardeazabal 2003.

97. Abadie, Diamond, and Hainmueller 2015.

liberalization.[98] In this case, "synthetic Taiwan" represents the weighted average of potential control countries, with weights chosen to closely reproduce the values of a set of predictors of international reserves during the decade prior to IMF expulsion (1970–1979). We can then compare the evolution of reserves in Taiwan and synthetic Taiwan during the subsequent decade (1980–1990).

Our expectation is that Taiwan's reserves should increase sharply after its expulsion from the IMF in 1980 compared to the trajectory for synthetic Taiwan. Taiwan's expulsion shifted its status from a relatively privileged member of the IMF to maximal *absence* of privilege, that is, no expectation of IMF assistance whatsoever. This change should be associated with a buildup of international reserves as IMF moral hazard was abruptly removed.

As with earlier analyses, we use international reserves as a share of GDP as the dependent variable. We obtained substantively similar results by using reserves in months of imports and the absolute level of reserves in current US dollars. As control cases, we include all countries in the international system for which data on reserves and the relevant control variables are available during the time period of interest. As predictor variables, we use the control variables from the earlier panel analysis: GDP PER CAPITA, GDP, the GDP GROWTH RATE, the INFLATION RATE, EXPORTS, IMPORTS, indicator for PEGGED EXCHANGE RATE REGIME, index for CURRENCY VALUATION, a dummy for OECD countries, and a dummy for East Asian countries. We also include prior values of the dependent variable—international reserves in 1979, 1975, and 1970—following the recommendation of Abadie, Diamond, and Hainmueller.[99] The results are highly robust to alternative selections and combinations of control variables.[100]

As Figure 1 shows, international reserves in Taiwan and synthetic Taiwan closely resemble one another until 1980, the year when Taiwan was expelled from the IMF. Subsequently, a large gap opens up, with Taiwan's reserves increasing dramatically while reserves for synthetic Taiwan remain flat. In the online appendix we show that the predictor means are well balanced and provide a full list of country weights: synthetic Taiwan most heavily weights Thailand (0.42), South Korea (0.33), and Turkey (0.17).

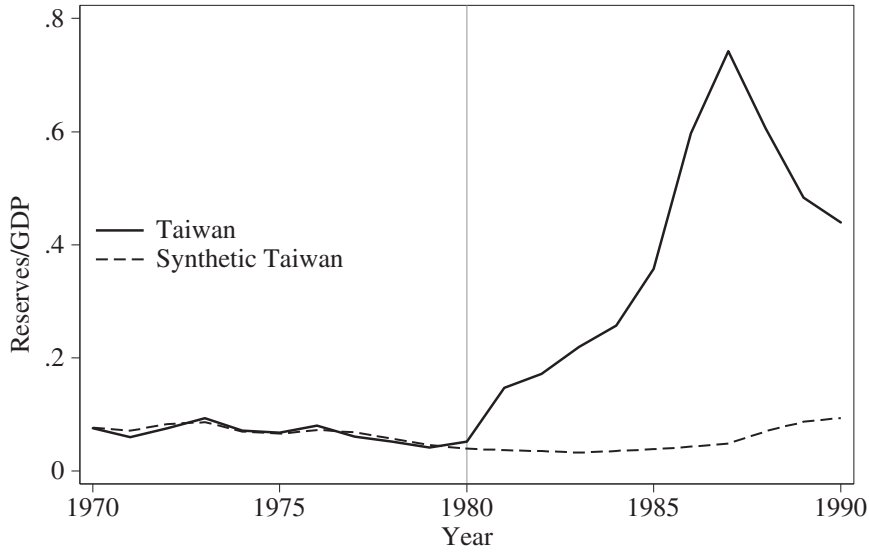
The change in Taiwan's reserves during this period was substantively significant. In 1980, Taiwan's reserves were $1.4 billion US dollars, equivalent to 1.0 month of imports, considerably below the global average of 3.8 months of imports. By 1990, Taiwan's reserves had increased to $72.4 billion, or about 13.2 months of imports,

98. Billmeier and Nannicini 2013.

99. Abadie, Diamond, and Hainmueller 2011.

100. The composition of countries represented in synthetic Taiwan varies depending on which control variables are used, but in no case does reserve accumulation in synthetic Taiwan rise sharply like that of actual Taiwan in the post-treatment period. This reflects the fact that Taiwan's reserve accumulation was essentially sui generis in the post-treatment period. We also tried using the following control variables: trade openness, population size, government revenue, government spending, government deficit, polity score, number of veto players, a dummy for Asian Tiger, and a dummy for Asian miracle country. Some control variables cannot be used because of limited data availability in the relevant time period (1970–1990).

while the global average was essentially unchanged at 3.8 months of imports. No country in the world increased reserve holdings as much as Taiwan during this period: by 1991, Taiwan's reserve holdings exceeded much larger economies such as Japan, the United States, and Germany to become the largest in the world in absolute terms.

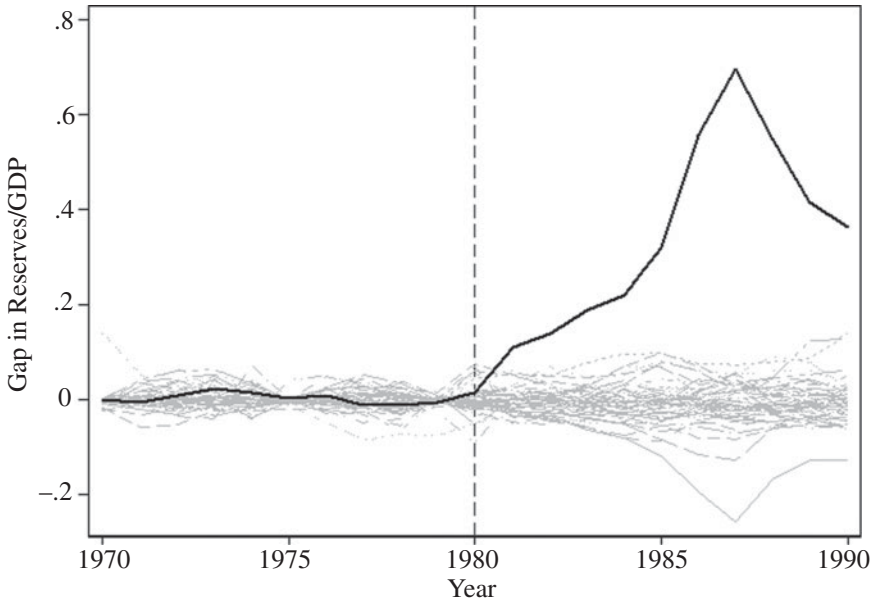


Note: International reserves increased sharply in Taiwan after expulsion from the IMF in 1980, while they were essentially flat for synthetic Taiwan.

FIGURE 1. *Trends in international reserves/GDP in Taiwan vs. synthetic Taiwan*

We performed several placebo tests to confirm that the movement of Taiwan's reserves after IMF expulsion stands out in international comparison. First, we performed a permutation test in which synthetic control estimates are derived for all control countries as if they were treated in 1980. This allows us to guard against simultaneous shocks that might have affected the reserve accumulation behavior of countries in 1980. The results are presented in Figure 2. For all countries analyzed, the figure depicts the gap in reserves between the "treated" country and the synthetic control. The solid line is Taiwan. As the figure shows, Taiwan clearly stands out in comparison to all countries in the sample: there is no other country that exhibits a similar, sustained increase in reserves compared to the synthetic control after 1980. In statistical terms, the likelihood that Taiwan's reserve accumulation occurred by chance is less than 2 percent.[101]

101. 1/54 countries = 0.019. Singapore was dropped from the permutation test because its reserves were very poorly estimated in the pretreatment period.



Notes: This figure depicts the results of a permutation test in which the synthetic control method is applied to all countries in the sample, and the gaps in reserves between the "treated" country and the synthetic control are calculated. The thick line is the gap between Taiwan and synthetic Taiwan, and analogous results for control countries are in gray. As the figure shows, the gap associated with Taiwan (i.e., the divergence between Taiwan and synthetic Taiwan) conspicuously differentiates itself from other countries, with small gaps prior to treatment and a large, positive gap afterward.

FIGURE 2. *Placebo test: Reserve gaps in Taiwan and control countries*

We also performed an additional placebo test by assigning 1971 as the treatment year. In 1971, Taiwan lost its credentials in the United Nations to China, an event that marked the beginning of international isolation. If international isolation, rather than the loss of IMF membership, was the driver of Taiwan's reserve accumulation, we would expect Taiwan's reserves to start increasing at this point. However, the analysis provides no evidence for this: Taiwan's reserves did not increase in comparison to synthetic Taiwan when the treatment year is set to 1971. These results are available in the online appendix.

Another potential explanation for Taiwan's reserve accumulation is its evolving relationship with the United States. The US initiated "ping-pong diplomacy" with China in 1971, gradually improved informal bilateral relations with the mainland, and switched formal diplomatic recognition from Taiwan to China in January 1979. However, it is highly unlikely that a change in bilateral relations with the US alone precipitated Taiwan's shift in reserve accumulation behavior. For one, severance of formal diplomatic relations in January 1979 was followed by the April 1979 Taiwan Relations Act, which assured that US–Taiwan relations would continue

largely unchanged. The act established a de facto US embassy (the American Institute in Taiwan) and maintained the validity of all previous US–Taiwan economic agreements. Economic relations between Taiwan and the US remained virtually unchanged.[102]

We are limited to yearly increments for the synthetic control method because of data availability for the control variables. However, the raw data for Taiwan's reserves are available on a monthly basis. Figure 3 depicts Taiwan's reserves in current US dollars for every month between January 1975 and January 1985. We use the absolute value of reserves because data for GDP and imports are unavailable on a monthly basis. The data are log transformed to allow comparisons of percentage changes during the time period depicted. The figure clearly shows a shift in Taiwan's reserve accumulation immediately after April 1980, the month in which Taiwan was expelled from the IMF. There is no comparable shift associated with any other month depicted, including January 1979, when the US transferred diplomatic recognition to China.

Consistent with our theoretical premises, Taiwan has adopted an exceptionally conservative policy of self-insurance after being expelled from the IMF. Despite its relatively small economy, Taiwan's international reserves have been among the largest in the world since the mid-1980s: they are currently the fifth largest in absolute terms, behind only China, Japan, Saudi Arabia, and Switzerland.[103] In addition, the reserves have been invested extremely conservatively: Taiwan has no sovereign wealth fund and has allocated its reserves primarily in US Treasuries and gold.[104]

Taiwan has also pursued relatively conservative policies regarding financial liberalization and capital inflows.[105] Taiwan's conservative regulatory policies and large stock of reserves are frequently cited as reasons for how it was able to weather the 1997–98 Asian crisis and 2008 global financial crisis relatively unscathed.[106] Taiwanese government officials indicate that this behavior is motivated by the understanding that no international organization will come to Taiwan's rescue in the event of a crisis.[107] In the words of Taiwan's former finance minister, Paul Chiu, "We are

102. Wong 1999, 12–13.

103. Data as of 2015.

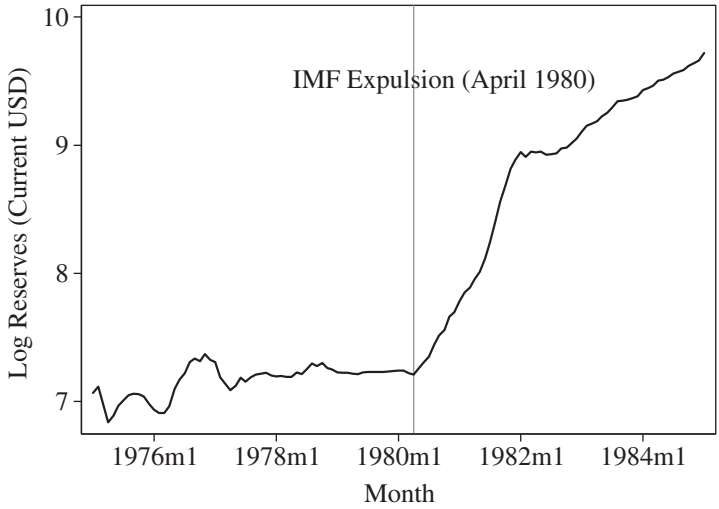
104. Personal interview with Taiwanese officials in the Ministry of Economic Affairs and Foreign Affairs, 2011.

105. For example, according to the index of financial liberalization compiled by Abiad, Detragiache, and Tressel 2010, Taiwan was the least liberalized of the Asian Tigers (Hong Kong, Singapore, South Korea, Taiwan) during the entire period that data are available, and it was also less liberalized than the Southeast Asian NICs (Indonesia, Malaysia, Thailand) in the run-up to the Asian Crisis, despite having a much more developed economy.

106. Among others, see Chu 2015; Dean 2001; Flood and Marion 2001; Radelet and Sachs 1998; Yang 2001.

107. Personal interview with Taiwanese officials in the Ministry of Economic Affairs and Foreign Affairs, 2011. Also see discussion of IMF expulsion by Yu Kuo-hwa (Governor of the Central Bank of China) in "Minutes of the Eighth General Meeting of the Sixty-fifth Session of the Financial Committee of the Legislative Yuan", *Government Gazette of the Legislative Yuan (Taiwan)* 69 no. 85 (1980):34–43.

not a member of the IMF or World Bank, so we have to rely on our own resources."[108]



Notes: Taiwan's reserves started rising sharply after April 1980, the month Taiwan was expelled from the IMF. There is no comparable increase in the pace of reserve accumulation in other months depicted, including January 1979, when the US switched diplomatic recognition to China.

FIGURE 3. *Taiwan's reserves on a monthly basis (log of current USD), 1975–1985*

Taiwan's reserve accumulation is often attributed to its export orientation, though some scholars also recognize the precautionary motivations associated with its lack of membership in the IMF.[109] The two motivations are somewhat intertwined. Taiwanese authorities accumulated reserves by intervening heavily in foreign exchange markets, holding down the value of the New Taiwan Dollar and running large current account surpluses.[110] However, it is highly unlikely that export orientation alone accounts for Taiwan's reserve accumulation since 1980. For one, Taiwan's shift to export-oriented industrialization happened much earlier in 1958–1960 than its shift toward reserve accumulation, which took place in 1980.[111] In addition, among other East Asian export-oriented economies often compared to Taiwan, reserve accumulation was much more modest during the period when Taiwan sharply increased

108. "Taiwan: Silicon Island Survives Natural Adversities: There Are Renewed Hopes of WTO Membership, but Cross-strait Political Tensions Remain the Biggest Challenge," *Financial Times*, 24 November 1999.

109. Chu 2015; Liu 1992; Villanueva 1999.

110. Flood and Marion 2001.

111. Haggard 1990; Rowen 1998; World Bank 1993, chapter 3.

its reserves.[112] Reserve accumulation in the rest of the region took off primarily after the Asian Financial Crisis, when IMF intervention was widely perceived as unresponsive to regional interests.[113]

Conclusion

Political imbalances within the IMF have important economic consequences for the global economy. Because IMF decision making is heavily politicized and biased toward the interests of a subset of influential states, the international system is effectively governed by a biased insurance mechanism. This bias produces asymmetrical moral hazard, encouraging some countries to pursue risky policies while countries lacking influence are compelled to pursue aggressive self-insurance through the accumulation of international reserves.

We analyzed a panel data set covering 1980 to 2010 and found that countries expected to exercise strong influence over the IMF tend to receive favorable treatment from the institution. Crucially, these countries also exhibit distinct characteristics of moral hazard: relatively low levels of reserves and frequent currency crises. In contrast, countries with limited leverage over the IMF tend to pursue self-insurance, accumulating precautionary reserves and experiencing crises less frequently. To evaluate our causal claims, we leveraged Taiwan's unique status vis-à-vis the IMF. Taiwan's expulsion from the institution in 1980 created an abrupt disjuncture, shifting the country from a relatively privileged position in the institution to nonmembership, under which no future support could be expected. As predicted, this led Taiwanese authorities to pursue aggressive self-insurance, rapidly accumulating reserves and maintaining conservative financial policies.

Our findings have important implications for contemporary debates over global economic imbalances. In recent years, global economic imbalances have become an increasingly salient political and economic issue. The fixed and undervalued exchange rates, reserve accumulation, and current account surpluses of several developing countries, particularly in East Asia—coupled with a large US current account deficit—became widely known as "Bretton Woods II," a new iteration of the post-World War II international monetary order.[114] Donald Trump rose to power in the United States promising to revive the country by reversing persistent trade deficits. The pattern of reserve accumulation in recent decades represents a perverse flow of capital from developing countries—where returns on invested capital

112. For example, between 1980 and 1990, when IMF expulsion led Taiwan to sharply increase its reserves/GDP by 913 percent, other export-oriented economies among the Asian Tigers and Southeast Asian NICs increased their reserves much less or decreased their reserves: South Korea (50 percent), Singapore (67 percent), Thailand (135 percent), Malaysia (-17 percent), and Indonesia (-32 percent).

113. Lipscy 2017, chapter 4.

114. Dooley, Folkerts-Landau, and Garber 2003.

ought to be higher—to developed states.[115] Most existing explanations for global imbalances have focused on underlying economic factors.[116] Our findings suggest that greater attention needs to be paid to *political imbalances* within the IMF: countries that cannot expect generous treatment by the IMF have a stronger propensity to accumulate precautionary international reserves, contributing to global economic imbalances.

Our findings also suggest an asymmetric impact of IMF lending on the activities of internationally active financial institutions. One of the implications of our quantitative analysis is that the IMF is more likely to bail out highly exposed Western financial institutions on generous terms. In domestic financial markets, large banks that are deemed "too big to fail" receive significant advantages, including higher valuations[117] and lower risk premiums.[118] As we have asserted, "too big to fail" in the international context is a function of influence over IMF policymaking. As such, Western financial institutions enjoy unfair competitive advantages in international lending. For the past several decades, Japanese financial institutions have been the primary non-Western lenders in international markets and hence most likely to face the adverse consequences of this asymmetry. As other countries develop economically and expand their international financial activities, this issue is likely to become increasingly salient.

Our account demonstrates that contestation over representation and influence in the IMF is not simply a matter of national ego or prestige. The IMF has recently pursued a series of reforms to realign its quota shares and formulas. The fourteenth annual review, which came into effect in 2016, shifted about 6 percent of quota shares in favor of underrepresented countries.[119] However, these measures are modest in their formal effect[120] and do little to remedy informal biases in IMF governance. These disparities are set to widen further as economic growth in developing countries exceeds that of overrepresented Western countries. The broader consequences of political bias in the IMF will remain an important topic for ongoing research.

Supplementary Material

Supplementary material for this article is available at <https://doi.org/10.1017/S0020818318000371>.

115. Gourinchas and Jeanne 2007; Summers 2007.

116. For example, a global savings glut (Bernanke 2005), distortions in domestic policies followed in the United States and abroad (Obstfeld and Rogoff 2009), a global shortage in reliable and tradable assets (Gourinchas, Caballero, and Farhi 2008), and asymmetries in financial market depth (Mendoza, Quadrini, and Rios-Rull 2007).

117. Brewer and Jagtiani 2009.

118. Voelz and Wedow 2009.

119. International Monetary Fund, "IMF Quotas," 21 April 2017, retrieved from <http://www.imf.org/en/About/Factsheets/Sheets/2016/07/14/12/21/IMF-Quotas>.

120. For example, although China is the world's second-largest economy in nominal terms and the largest according to purchasing power parity, its quota share in the IMF remains third behind the United States and Japan.

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